

- 1 -

**DESCRIPTION****"Prop"**5        **Technical field of the invention**

The invention relates to a prop, particularly applicable to formworks, extendable by means of the removal of an inner tube coaxially disposed in an essentially vertical outer base tube.

10       **Background of the invention**

The props are vertical supports whose height is adjustable, usually used in construction, composed of an outer vertical base tube, equipped on its lower end with a support leg and an inner tube, which can be removed from the base tube to a greater or lesser extent by adjusting the length of the prop to the  
15 distance between the surfaces or elements to be supported by the prop. Generally, the inner tube is also equipped on its outer end with a support configured in the form of a horizontal platform so that the weight which is to be supported by the prop is distributed over a greater surface.

Props are equipped with securing means which enable the position of  
20 the inner tube to be fixed once it has been sufficiently removed from the base tube. When the securing means are not operational, the inner tube slides freely inside the base tube. In such circumstances it is possible to completely remove the inner tube.

On occasions, and particularly when the prop is handled and turned  
25 upside down or inclined with respect to its normal working position, the inner tube can be completely removed, by chance or accidentally, which can cause serious industrial accidents.

In order to avoid these situations, props are known which are equipped with safety devices which prevent the total removal of the inner tube from the  
30 inside of the base tube.

An example of embodiment is disclosed in ES 1031628, which makes reference to a prop with a safety pin device, which in a part close to its lower end has two orifices which are diametrically opposed, wherein a tab is housed, disposed across the inner tube and which is slightly longer than the diameter of  
35 the inner tube so that its ends protrude through said orifices, but without touching the inner wall of the outer tube, the existence of a washer positioned

externally with the possibility of being able to move freely with regards to the tube activating nut having been planned, (which is that which in its movement, be it up or down, drags the inner tube to manage to vary the final length of the prop), said washer having an inner diameter smaller than the length of the tab.

5           Other embodiments also comprise inner limits, solidly joined to the inner tube, designed to collide with projections of different shapes and dimensions disposed also solidly joined in the base tube.

          Although the safety devices do not enable the total removal of the inner tube, the separation of the latter is not easy. Moreover, neither do they allow  
10 both tubes to remain joined when the inner tube is completely removed from the inside of the base tube, which would avoid risky situations but which would enable access to the lower end of the inner tube.

          What is worthy of note, therefore, is the lack of a prop with a safety device which allows both tubes to be easily separated when necessary and  
15 access to the lower end of the inner tube, with the total removal of the inner tube, without both tubes being completely separated, guaranteeing safety and avoiding an unwanted accidental separation.

#### Explanation of the invention

20           The prop of the invention is extendable, by means of the removal of an inner tube coaxially disposed in an outer base tube, and it comprises securing means of the position of said inner tube with regards to the outer base tube, as well as a safety device which prevents the total separation of the two tubes when the securing means are inoperative.

25           Essentially the prop is characterised in that the safety device comprises connection means between both tubes which prevent their separation but which enable the movement of the inner end of the inner tube between two fixed points, the first point of which is in the inside of the outer base tube, as the second point is determined by the length of said connection means.

30           According to a preferred embodiment the connection means are composed of a thin, elongated connection element, such as a rod, a cable or similar, disposed lengthways on the inside of the outer base tube, the first end of the connection element being removably fixed on one end of the tube while the opposite end, inserted into the inner tube, is equipped with a stop block  
35 which prevents its removal from the inner tube by colliding with a retaining element joined to the inner end of the inner tube, preventing the exit of the stop

block from the inside of the inner tube.

According to another characteristic of the invention, the retainer is formed by a lid, which is equipped with a through-hole whose diameter is less than that of the stop block, which allows the connection element to pass  
5 through it but prevents the stop block from passing through it.

According to another aspect of the invention, the inner tube is equipped with a second through-hole on one side, adjacent to the orifice of the lid, preferably with a section the same as that of the stop block and connected with said orifice of the lid through a slot considerably wider than that of the  
10 connection element.

#### Brief description of the drawings

The attached drawings illustrate, by way of non-limiting example, a preferred embodiment of the prop object of the invention. In said drawings:

15 Fig. 1, is an elevational view in section of the prop object of the invention in normal position;

Fig. 2, is an elevational view in section of the prop object of the invention in an inverted position and extended;

Fig. 3, is a detailed view of the lower end of the inner tube of the prop;

20 Fig. 4, is a detailed view of the connection element of both tubes and of the stop block disposed at one of the ends;

Fig. 5, is a detailed view of the lowest end of the base tube and of the removable fixing of the end of the rod to said base tube; and

25 Fig. 6, is a detailed view of the lowest end of a base tube, in inverted position, and of the removable fixing of the end of the rod to said base tube according to another embodiment.

#### Detailed description of the drawings

Prop 1 in Figs. 1 and 2 is formed by 2 tubes, a first outer base tube 3  
30 and a second inner tube 2, which can be slid through the inside of the base tube 3 in such a way that it can be removed from the latter to a greater or lesser extent, depending on the length that the prop is desired to be.

In said figures, the fixing means of both tubes 2 and 3 which allow them to be fixed once prop 1 has been adjusted to the length desired for its use have  
35 not been depicted.

Fig. 1, which portrays prop 1 in its normal position, shows that on the

inside of the base tube 3 the connection means 12 is disposed, composed of a rod which carries out the connection functions between the two tubes 2 and 3. The rod 12 is removably coupled to the lowest end 17 of the base tube 3. To such effect, the rod 12 is equipped at its end with a retainer ring to (13), which is permeated by a pin 14 which goes through the base tube 3 and which is attached to the latter by screws 15 or by any other known method.

As an alternative to the system depicted in Figs. 1 and 2, the inventor has provided other types of attachment of the end of the rod 12 to the lowest end 17 of the base tube. An example of such systems is portrayed in Fig. 5, wherein one can observe that the rod 12 is equipped at the end which can be fixed with a widening 20 and that the lower end of the base tube 3 is equipped with a lower support 19, equipped in turn with a raised central portion 24, provided with a through-hole 22, through which the end of the rod 12 is inserted into said widening zone 20, which blocks the passage of the rod 12 through the through-hole 22. This raised central portion 24 of the lower support 19 can be configured in such a way that should the prop be used in the reverse position to the normal one, it can receive one of the pivots which normally protrude downwards from the structure whereon the boards of the formwork rest from a higher level. In such circumstances the formwork would be supported by means of said structure, in the lower support 19, which would act as an upper support.

By way of an example, Fig. 6 depicts, on an unrepresentative scale, a lower support which, due to the use of the prop in reverse position, carries out the functions of upper support. The raised central portion 24 of said support is configured in the form of a deep cavity so as to be able to fit a pivot 25 provided to such effect in the support structure of a formwork board from an upper floor.

In Fig. 5 the end 23 of the rod 12 which protrudes from the through-hole 22 is equipped with an external thread wherein a nut 21 or similar is screwed and the rod 12 is attached in this way to the base tube. It is worth mentioning that other methods of attachment are also considered for the end of the rod 12 to the support 19, which can be joined together by welding, riveting or simply by deforming the end of the rod 12, which protrudes from the through-hole 22.

In any case, the rod 12 is longitudinally disposed on the inside of the prop 1 and goes through the lid 8 of the lower end 7 of the inner tube 2 through the through-hole 9 (Fig. 4).

At the opposite end 18 to that which is attached to the base tube 3, the rod 12 is equipped with a stop block 6 which, as Fig. 1 indicates, is disposed

inside the inner tube 2.

If the position of the prop 1 is inverted with regards to its normal working position, the tube 2 can slide through the inside of the base tube 3, in the direction indicated by the arrow 16 in Fig. 2., until the lid 8 collides with said stop block 6, since the size of the latter is greater than that of the diameter of the through-hole 9 of the lid 8. At this point the inner tube 2 cannot be moved further outwards. This situation is depicted in Fig. 2.

To absorb the impact of the stop block 6 on the lid 8, the stop block will be equipped with a shock absorber, such as a spring, rubber or similar, or the stop block will be made from a material which absorbs part of the impact. In the same way, should the connection means 12 be composed of a cable or similar, in accordance with another variant of the invention, it is provided that the latter have elastic properties to absorb part of the impact of the stop block 6 on the lid 8, or on an equivalent element.

Depending on the length of the rod 12 and the inner tube 2, the latter will be totally removed or not from the base tube 3 when the stop block 6 stops the inner tube 2 from sliding, upon colliding with the lid 8 of its lower end 7. Thus, if the rod 12 is of a sufficient length, it will be possible to completely remove the tube 2 from the base tube 3, but they will remain joined by the rod 12 and the stop block 6. Conversely, if the rod 12 is shorter than the base tube 3, it will not be possible to completely remove the inner tube 2 from the base tube 3.

Figs. 3 and 4 show the end of the rod 12 in detail, equipped with a stop block 6 and with the lower end 7 of the inner tube 2, respectively.

Should it be impossible to remove the lid 8, in order to facilitate mounting the prop 1, the inner tube 2 is equipped with a second through-hole 10, with a girth the same as that of the stop block 6, through which said stop block 6 can be inserted into the inside of the inner tube 2. The second through-hole 10 is connected to the through-hole 9 of the lid 8 by a slot 11, which allows the inner tube and the rod 12 to be disposed in line once the stop block 6 has been inserted into the inner tube 2 through the through-hole 10, in such a way that the inner tube can be inserted into the base tube. The same operation, but the other way around, must be carried out should one wish to separate the rod 12 from the inner tube 2 and remove the stop block 6 from inside the inner tube 2.

If the rod 12 were longer than the base tube 3, to ensure that the stop block can not come out from inside the inner tube 2 once the latter has been

completely removed from the base tube 3, the stop block 6 can be equipped with a section with a polygonal outline, coinciding with that of the second through-hole 10 of the side of the inner tube, so that the stop block 6 could only be removed from the inner tube 2 through the orifice 10, disposing the rod 12 in a perpendicular position with regards to the inner tube 2, which is practically impossible to happen by chance or accidentally. Naturally, the same would happen if the length of the stop block were greater than that of the diameter of the orifice 10.

When the prop 1 is being mounted, and to facilitate the insertion of the rod 12 through one end of the tube 2 and through the through-hole 9 of the opposite end, it has been envisaged to make the tube 2, in the part close to the through-hole 9, gradually narrower outwardly from its inner section, in the form of a neck or a funnel so that the lower end of the rod 12 is directed towards the through-hole 9. Such a configuration in the form of a funnel can also be attained in the base tube 3, close to the through-hole 22, if it exists.